Statement Submitted to the Committee on Energy and Commerce, House of Representatives, Congress of the United States.

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I am delighted to be here to discuss telemedicine with you, thank you for the opportunity. I have focused on studying telemedicine for more than four decades. It began when I was seconded to the Institute of Medicine from my faculty position at the University of Michigan from 1970 to 1972. In 1973, the National Science Foundation provided funding for me to assess the status of telemedicine in the United States; and to report on the lessons learned from the early experience based upon demonstration projects funded by the Federal government. And, I have been at it ever since.

For convenience in my presentation I will use the term telemedicine (also referred to as telehealth, e-health, m-health and connected health) to include all forms of electronic information exchange between patients and providers among providers and between all users and sources of health information.

I would like to begin by making a few general remarks about current health and medical care issues that are of serious concern to

policymakers, health professionals and citizens alike. And, following this, I will try to highlight the role of telemedicine in addressing these issues. The issues include : (1) the differential access to healthcare among segments of the population based on geographic, socio-economic, cultural, and other factors; (2) the uneven distribution of medical expertise and health resources at the state, regional, and national levels; and, of course (3) the continuing escalation in the cost of care. These seemingly intransigent problems are exacerbated by; (a) the aging of the population (with the attendant increase in chronic illness); (b) some structural inefficiencies in the financing and delivery of care (such as the prevailing traditional modes of delivering care only in the office, clinic or hospital, and the fee-for-service system); (c) the prevalence of adverse life styles (smoking, obesity, sedentary life, and excessive drinking); and, perhaps ironically; (d) advances in medical science, technology and pharmaceuticals that have simultaneously contributed to saving lives, reducing medical infirmities; while also driving costs upward.

Telemedicine development has accelerated over the last few decades not only because of vast improvements in the underlying

technology, but more importantly because of its promise to address the triad problems of access, cost and quality.

A large and growing body of evidence has demonstrated the capacity of telemedicine to assist in accomplishing the following:

- **Improve access to quality care at all levels (primary, secondary and tertiary). Make appropriate care available within people's daily activity spaces, that is, where they live, work, shop and study.**
- **Promote patient-centered care at lower cost in local communities which, in turn, contribute to stabilizing local health resources and economies.**
- **Promote development of integrated care systems to assure quality and continuity of care, and safety.**
- **Support the development of the "medical home" among the chronically ill; and, improve the efficiency and effectiveness of chronic disease management in the home and in long term care facilities as well.**

- **Enhance efficiency and effectiveness in remote on-site triage for consultations in critical cases, prompt and appropriate referrals, and follow-up care.**
- **Improve clinical decision making, prescription ordering and remote mentoring among providers**
- **Enhance active involvement in shared decision making and self- care among better informed patients.**
- **Promote the adoption of healthy lifestyles.**

This is not hopeful speculation. As I mentioned, there is a large and growing body of evidence, albeit not always based on hard science, which attests to these capabilities.

Indeed, no one needs to prove:

- **The merit of ready access to expert medical consultations at low cost in the face of serious illnesses and life-threatening conditions.**
- **That obviating travel and reducing waiting times for patients and their families by providing appropriate quality care in their local community and referrals only when necessary is a step in the right direction.**

- **That ready access to knowledge by providers on evidence-based medicine is in the best interest of the patient.**

- **That giving providers immediate access to complete and accurate electronic health records which include patients' medical history, allergies and medications would enable them to make better clinical decisions and to avoid errors and adverse events from medication contraindications.**

- **That educating patients to adopt healthy lifestyles and to take an active part in their own care is inherently good and saves money.**

- **That avoiding unnecessary medical visits for pre- and post-surgery appointments……..The list goes on….**

On a more personal level, no one needs to prove that saving the life of a teenage boy presenting with cardiac arrest in a remote community hospital through a telemedicine link to pediatric intensivists in a tertiary care medical center is worth the limited cost of a versatile telemedicine network that can serve a variety of other functions. I know of one tragic event where such a boy died en route

to a tertiary care hospital when a remote consultation with a pediatric intensivist could have saved his life.

With such enormous demonstrated potential, the obvious question is not "why telemedicine" but "why not telemedicine"? What are reasons for delay in wider implementations of telemedicine?

Allow me to highlight a few:

(1) Telemedicine represents a new paradigm that challenges our traditional mode of care delivery. Change is likely to occur slowly. The inertia of change is strong and such a paradigm shift can be expected to occur slowly. Nonetheless, we are now witnessing major transformations not only in the adoption of electronic health records and personal health records, but also in vast expansions in the adoption of information and communication technology in various facets of health care delivery. Today, no health system in the private or public sector can survive without reliance on ICT in one form or another (as in appointments, billing, and so on).

(2) We may still be mired in another paradigm, namely, dysfunctional traditions in the financing and delivery of healthcare, including a traditional fee-for-service system that has outlived its

usefulness and an outmoded system, for example, of serving the chronically ill by means of the revolving door system established on the basis of acute care.

(3) The Federal government has emphasized the deployment of important tools, such as the EHR and the PHR, with only limited attention to the necessity of incorporating them into telemedicine systems and networks that optimize their use. The total expenditure on telemedicine service by CMS was $12 million in 2013, as compared to the billions spent on broadband and telemedicine infrastructure.

(4) Reimbursement for telemedicine services has been largely limited to rural areas in order to meet the legitimate unmet needs of rural and remote communities while the unmet needs of large groups/population segments in major urban areas have similar unmet needs.

(5) Reimbursement is also limited the least efficient modality of telemedicine service, namely synchronous video communication between an originating site and a remote site. Only Alaska and Hawaii are exempt from this stipulation.

(6) We have yet to open the door fully for connectivity between providers of care on the one hand and schools, workplaces, and homes on the other hand.

(7) And finally, we are struggling to find the right balance between state-based prerogatives over medical licensing and regulation and the vast potential of competition in improving quality and reducing cost.

Summation

Telemedicine systems constitute innovative systems of care that rely on information and communication technology to enable, facilitate and enhance

(1) Doctor-patient interaction regardless of time or distance barriers by obviating the need for travel and other inconveniences for both patients and itinerant providers.

(2) The acquisition, exchange, processing and storage of health information of various types and complexities for safe and effective clinical decision making on the part of providers, as well as shared decision making on the part of patients.

(3) The efficiency and effectiveness of health systems through (a) onsite triage whereby patients are served in their local communities by their usual providers with advice and supervision by remote specialists, and transferred only when necessary; and (b) avoidance of unnecessary clinic and emergency room visits and hospitalization.

(4) The effectiveness of continuing medical education through the provision of prompt and patient-specific evidence-based medical knowledge.

To be sure, telemedicine has costs as well as benefits. The costs include hardware and software, technology support and maintenance, initial training, and human resources. The prices of the technological components and connectivity are on a downward trend.

When properly implemented, the benefits of telemedicine systems include enhanced care coordination between various providers as well as continuity of care at various sites. It would enable patients receive they care they need by the appropriate provider, at the appropriate setting, and closest to where they work and live as indicated by their need. However, these benefits vary

according to the perspective of patients, providers and society at large.

- **Patients located in remote, isolated, or confined environments would have ready access to clinical resources.**
- **Patients would receive medical care from remote medical experts while staying closer to where they live and work, obviating the need for travel.**
- **Patients would receive the appropriate care at the appropriate site and the appropriate time.**
- **Patients suffering from chronic illness can be monitored in their home environments while receiving educational materials and learning reinforcement, information on medication management, and control of health risks behaviors.**
- **Providers in remote communities would have ready access to colleagues in medical centers for consultations, second opinion, and diagnostic expertise available in tertiary care centers, while keeping their patients in the local community.**
- **Providers in tertiary care centers would extend their reach to serve a widely distributed patient population, mentor colleagues, and provide continuing medical education.**

- **Health systems (academic medical centers and other large health systems) can improve their efficiency and effectiveness by avoiding unnecessary re- hospitalization and emergency room visits.**
- **Small community hospitals can improve their census by establishing effective relationships with tertiary care centers for prompt consultations, mentoring, continuing medical education and referrals.**
- **Payers may save on cost by virtue of early intervention, effective substitution of costly care by less costly care, medication compliance, and healthy behavior.**
- **Society at large can benefit from (a) reduced carbon footprint by virtue of obviated travel; (b) stabilization of local community hospitals and local health resources by virtue of ongoing support from tertiary care centers; (c) cost savings from effective substitutions of virtual use of service for in-person.**

Clearly, telemedicine systems consist of a set of inputs and outputs. The inputs consist of a combination of technological configurations, health manpower mixes, organizational structures and new protocols for the remote delivery of healthcare, mentoring

and education. The outputs can be measured from various perspectives (the patient, the provider, the payer and society at large). The most critical outputs are changes in health status, costs, and access. Telemedicine changes both the processes of healthcare delivery as well as the outputs.

Telemedicine has the potential for transforming the current system of healthcare by creating seamless and ubiquitous healthcare with continuous care management in integrated systems with empowered patients as partners in every phase of care. Application of sensors, electronic information exchange, "just in time" education for patients, caregivers, and local providers are not only feasible, they have already been demonstrated and proven effective. Telemedicine can save money by early intervention, rapid response, and empowered patients. It can avoid costly complications of chronic diseases. It's tools can be used to reduce human resource costs, travel costs, and times wasted waiting as a substitute and not an add-on service. The expansion of this modality of care with proper goals; ongoing assessment together with attendant adjustments; and, quality controls would save money and improve health outcomes. It is

most effective when limited assets across state lines can be brought into play. Consumer feedback is necessary to avoid potential abuse and incompetence. National reciprocity with minimal paperwork and national data bases are necessary.

The technologies that can be used to promote adoption of healthy lifestyles (with enormous implications for cost saving) are wearable sensors, smart phones, and mobile devices (likely to become the dominant telemedicine technology). These technologies have produced efficiencies in the delivery of service to the point of need in entertainment, banking, commerce, and education. The same applies to healthcare. They can be essential in crises, for example, when used in clinical settings where time is of the essence such as cardiovascular and cerebrovascular diseases. As well, the chronically ill can manage their care and be monitored remotely.

With continuing public support for research and development for further deployment and refinement of these systems, there will be winners: patients, providers, and the public purse.

Respectfully Submitted,

Rashid Bashshur

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